

CLAIMS:

1. An allelic ladder mixture comprising one or more of the following allelic ladders :-

i) an allelic ladder for locus HUMVWFA31/A comprising one or more of alleles comprising or consisting of sequences :-

TCTA TCTG TCTA (TCTG)₄ (TCTA)₃;
TCTA (TCTG)₄ (TCTA)₇; or
(TCTA)₂ (TCTG)₄ (TCTA)₃ TCCA (TCTA)₃ or at least 75% homologous thereto;

ii) an allelic ladder for locus HUMTH01 comprising or consisting of sequence :-

(TCAT)₄ CAT (TCAT), TCGT TCAT; or at least 75% homologous thereto;

iii) an allelic ladder for locus D8S1179 comprising one or more of alleles :-

(TCTA)₈;
(TCTA)₂ TCTG (TCTA)₁₆ or at least 75% homologous thereto;

iv) an allelic ladder for locus HUMFIBRA/FGA comprising one or more of alleles comprising or consisting of the sequences :-

(TTTC)₃ TTTT TTCT (CTTT)₅ T (CTTT)₃ CTCC (TTCC)₂;
(TTTC)₃ TTTT TTCT (CTTT)₁₃ CCTT (CTTT)₆ CTCC (TTCC)₂;
(TTTC)₃ TTTT TTCT (CTTT)₁₆ CCTT (CTTT)₅ CTCC (TTCC)₂;
(TTTC)₄ TTTT TT (CTTT)₁₅ (CTTC)₃ (CTTT)₃ CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₁₆ (CTTC)₃ (CTTT)₃ CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₁₇ (CTTC)₃ (CTTT)₃ CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₈ (CTGT)₄ (CTTT)₁₃ (CTTC)₄ (CTTT)₃
CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₈ (CTGT)₅ (CTTT)₁₃ (CTTC)₄ (CTTT)₃
CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₁₁ (CTGT)₅ (CTTT)₁₄ (CTTC)₃ (CTTT)₃
CTCC (TTCC)₄;

(TTTC)₄ TTTT TT (CTTT)₁₀ (CTGT)₅ (CTTT)₁₃ (CTTC)₄ (CTTT)₃
CTCC (TTCC)₄;

(TTTC)₄ TTTT TT (CTTT)₁₂ (CTGT)₅ (CTTT)₁₄ (CTTC)₃ (CTTT)₃
CTCC (TTCC)₄; or

(TTTC)₄ TTTT TT (CTTT)₁₄ (CTGT)₃ (CTTT)₁₄ (CTTC)₄ (CTTT)₃
CTCC (TTCC)₄; or at least 75% homologous thereto;

v) an allelic ladder for locus D21S11 comprising one or more of alleles comprising or consisting of sequences :-

(TCTA)₄ (TCTG)₆ (TCTA)₃ TA(TCTA), TCA (TCTA)₂ TCCATA
(TCTA)₆ TCGTCT;

(TCTA)₅ (TCTG)₆ (TCTA)₃ TCA (TCTA)₂ TCCATA (TCTA)₉ TCGTCT;

(TCTA)₅ (TCTG)₆ (TCTA)₃ TCA (TCTA)₂ TCCATA (TCTA)₁₀ TCGTCT;

(TCTA)₄ (TCTG)₆ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₈ TCGTCT;

(TCTA)₅ (TCTG)₅ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₉ TCGTCT;

(TCTA)₄ (TCTG)₆ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₀ TCGTCT;

(TCTA)₅ (TCTG)₅ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₁ TCGTCT;

(TCTA)₆ (TCTG)₅ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₁ TCGTCT;

(TCTA)₅ (TCTG)₆ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₂ TCGTCT;

(TCTA)₅ (TCTG)₆ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₁ TA TCTA TCGTCT;

(TCTA)₅ (TCTG)₆ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₂ TA TCTA TCGTCT;

(TCTA)₅ (TCTG)₆ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₃ TA TCTA TCGTCT;

(TCTA)₅ (TCTG)₆ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₄ TATCTA TCGTCT;

(TCTA)₁₀ (TCTG)₅ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₂ TCGTCT;

(TCTA)₁₁ (TCTG)₅ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₂ TCGTCT;

(TCTA)₁₁ (TCTG)₅ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₃ TCGTCT; or

(TCTA)₁₃ (TCTG)₅ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₂ TCGTCT; or at least 75% homologous thereto;

vi) an allelic ladder for locus D18S51 comprising an allele comprising or consisting of sequence :-

(AGAA)₈; or at least 75% homologous thereto.

2. An allelic ladder mixture according to claim 1 in which the mixture includes allelic ladders for a plurality of loci selected from HUMVWFA31/A, HUMTHO1, D8S1179, HUMFIBRA/FGA, D21S11 and D18S51.

3. An allelic ladder mixture according to claim 1 the mixture including allelic ladders for at least four loci.

4. An allelic ladder mixture according to claim 1 in which the mixture includes an amelogenin sex test.

5. An allelic ladder mixture according to claim 1 in which the allelic ladders in the mixture includes at least 7 alleles.

6. An allelic ladder mixture according to claim 1 in which the ladders, if present in the mixture, are provided such that: the HUMVWFA31/A allelic ladder includes at least 9 alleles; the HUMTHO1 allelic ladder includes at least 7; the D8S1179 allelic ladder includes at least 9 alleles; the HUMFIBRA/FGA allelic ladder includes at least 18 alleles or is present as HUMFIBRA/FGA/LW and HUMFIBRA/FGA/HW with the HUMFIBRA/FGA/LW ladder including at least 16 alleles, the HUMFIBRA/FGA/HW ladder including at least 6 alleles; the D21S11 allelic ladder includes at least 14 alleles; and the D18S51 ladder includes at least 15 alleles.

TRADE SECRET

7. An allelic ladder mixture according to claim 1 in which one or more of the allelic ladders in the mixture comprises at least 4 pairs of alleles 4 base pairs from each other.

8. An allelic ladder mixture according to claim 1 in which the ladders, if present in the mixture, are provided such that: the HUMVWFA31/A allelic ladder includes at least 7 pairs of alleles 4 base pairs from each other; the HUMTH01 allelic ladder includes at least 5 pairs of alleles 4 base pairs from each other; the D8S1179 allelic ladder includes at least 8 pairs of alleles 4 base pairs from each other; the HUMFIBRA/FGA allelic ladder includes at least 17 pairs of alleles 4 base pairs from each other; the D21S11 allelic ladder includes at least 3 pairs of alleles 4 base pairs from each other; and the D18S51 ladder includes at least 13 pairs of alleles 4 base pairs from each other.

9. An allelic ladder mixture according to claim 8 in which the D21S11 allelic ladder includes at least 8 pairs of alleles 8 base pairs from each other.

10. An allelic ladder mixture according to claim 1 in which the ladders, if present, are provided such that the HUMVWFA31/A ladder includes alleles ranging from 130 base pairs upwards and/or from 166 base pairs downwards; the HUMTH01 ladder includes alleles ranging from 150 base pairs upwards and/or 189 base pairs downwards; the D8S1179 ladder includes alleles ranging from 157 base pairs upwards and/or 201 base pairs downwards; the HUMFIBRA/FGA ladder includes alleles ranging from 173 base pairs upwards and/or 298 base pairs downwards; the D21S11 ladder includes alleles ranging from 203 base pairs upwards and/or 255 base pairs downwards; and the D18S51 ladder includes alleles ranging from 270 base pairs upwards and/or 326 downwards.

11. An allelic ladder mixture comprising an allelic ladder for one or more of the following loci, with lowest molecular

weight allele and/or uppermost molecular weight allele as follows :-

Locus	Low MW allele	High MW allele
a) HUMVWFA31/A	10	21
b) HUMTH01	4	13.3
c) D8S1179	7	19
d) HUMFIBRA/FGA	16.1	50.2
e) D21S11	53	81
f) D18S51	8	27

12. An allelic ladder mixture according to claim 11 in which the loci ladders have both the upper and lower limits specified.

13. An allelic ladder mixture according to claim 11 in which the mixture includes allelic ladders for loci HUMVWFA31/A, HUMTH01, D8S1179, HUMFIBRA/FGA, D21S11 and D18S51.

14. A method of analysing one or more samples comprising :-
a) obtaining genomic DNA from the sample;
b) amplifying the DNA;
c) obtaining an indication of one or more of the constituent parts of the sample; and comparing the indications with an allelic ladder mixture comprising one or more of the following allelic ladders :-

i) an allelic ladder for locus HUMVWFA31/A comprising one or more of alleles comprising or consisting of sequences :-

TCTA TCTG TCTA (TCTG)₄ (TCTA)₃;

TCTA (TCTG)₄ (TCTA)₇; or

(TCTA)₂ (TCTG)₄ (TCTA)₃ TCCA (TCTA)₅

ii) an allelic ladder for locus HUMTH01 comprising or consisting of sequence :-

(TCAT)₄ CAT (TCAT)₇ TCGT TCAT;

iii) an allelic ladder for locus D8S1179 comprising one or more of alleles comprising or consisting of sequences :-

(TCTA)₆; or

(TCTA)₂ TCTG (TCTA)₁₆;

iv) an allelic ladder for locus HUMFIBRA/FGA comprising one or more of alleles comprising or consisting of the sequences :-

(TTTC)₃ TTTT TTCT (CTTT)₅ T (CTTT)₃ CTCC (TTCC)₂;
(TTTC)₃ TTTT TTCT (CTTT)₁₃ CCTT (CTTT)₅ CTCC (TTCC)₂;
(TTTC)₃ TTTT TTCT (CTTT)₁₆ CCTT (CTTT)₅ CTCC (TTCC)₂;
(TTTC)₄ TTTT TT (CTTT)₁₅ (CTTC)₃ (CTTT)₃ CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₁₆ (CTTC)₃ (CTTT)₃ CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₁₇ (CTTC)₃ (CTTT)₃ CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₈ (CTGT)₄ (CTTT)₁₃ (CTTC)₄ (CTTT)₃

CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₈ (CTGT)₅ (CTTT)₁₃ (CTTC)₄ (CTTT)₃

CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₁₁ (CTGT)₃ (CTTT)₁₄ (CTTC)₃ (CTTT)₃

CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₁₀ (CTGT)₅ (CTTT)₁₃ (CTTC)₄ (CTTT)₃

CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₁₂ (CTGT)₅ (CTTT)₁₄ (CTTC)₃ (CTTT)₃

CTCC (TTCC)₄; or
(TTTC)₄ TTTT TT (CTTT)₁₄ (CTGT)₃ (CTTT)₁₄ (CTTC)₄ (CTTT)₃

CTCC (TTCC)₄;

v) an allelic ladder for locus D21S11 comprising one or more of alleles comprising or consisting of sequences :-

(TCTA)₄ (TCTG)₆ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA (TCTA)₆ TCGTCT;

(TCTA)₅ (TCTG)₆ (TCTA)₃ TCA (TCTA)₂ TCCATA (TCTA)₁₀ TCGTCT;

(TCTA)₄ (TCTG)₆ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA (TCTA)₈ TCGTCT;

(TCTA)₅ (TCTG)₆ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA (TCTA)₉ TCGTCT;

(TCTA)₄ (TCTG)₆ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA (TCTA)₁₀ TCGTCT;

$(TCTA)_4$ $(TCTG)_6$ $(TCTA)_2$ TA $(TCTA)_3$ TCA $(TCTA)_2$ TCCATA
 $(TCTA)_{11}$ TCGTCT;
 $(TCTA)_6$ $(TCTG)_5$ $(TCTA)_3$ TA $(TCTA)_3$ TCA $(TCTA)_2$ TCCATA
 $(TCTA)_{11}$ TCGTCT;
 $(TCTA)_5$ $(TCTG)_6$ $(TCTA)_2$ TA $(TCTA)_1$ TCA $(TCTA)_2$ TCCATA
 $(TCTA)_{12}$ TCGTCT;
 $(TCTA)_5$ $(TCTG)_6$ $(TCTA)_3$ TA $(TCTA)_3$ TCA $(TCTA)_2$ TCCATA
 $(TCTA)_{11}$ TA TCTA TCGTCT;
 $(TCTA)_5$ $(TCTG)_6$ $(TCTA)_3$ TA $(TCTA)_3$ TCA $(TCTA)_2$ TCCATA
 $(TCTA)_{12}$ TA TCTA TCGTCT;
 $(TCTA)_5$ $(TCTG)_6$ $(TCTA)_3$ TA $(TCTA)_3$ TCA $(TCTA)_2$ TCCATA
 $(TCTA)_{13}$ TA TCTA TCGTCT;
 $(TCTA)_5$ $(TCTG)_6$ $(TCTA)_3$ TA $(TCTA)_3$ TCA $(TCTA)_2$ TCCATA
 $(TCTA)_{14}$ TATCTA TCGTCT;
 $(TCTA)_{10}$ $(TCTG)_5$ $(TCTA)_3$ TA $(TCTA)_3$ TCA $(TCTA)_2$ TCCATA
 $(TCTA)_{12}$ TCGTCT;
 $(TCTA)_{11}$ $(TCTG)_5$ $(TCTA)_3$ TA $(TCTA)_3$ TCA $(TCTA)_2$ TCCATA
 $(TCTA)_{12}$ TCGTCT;
 $(TCTA)_{11}$ $(TCTG)_5$ $(TCTA)_3$ TA $(TCTA)_3$ TCA $(TCTA)_2$ TCCATA
 $(TCTA)_{12}$ TCGTCT; or
 $(TCTA)_{12}$ $(TCTG)_5$ $(TCTA)_3$ TA $(TCTA)_3$ TCA $(TCTA)_2$ TCCATA
 $(TCTA)_{12}$ TCGTCT;

vi) an allelic ladder for locus D18S51 comprising an allele comprising or consisting of sequence :-

(AGAA)_n

including allelic ladders or alleles 75% homologous thereto.

15. A method according to claim 14 in which the DNA sample is one or more of a sample taken from the scene of a crime, a sample associated with the scene of a crime, a sample obtained from a suspect, a sample obtained from a human under consideration (for instance for paternity or maternity analysis) or a reference sample.

16. A method according to claim 14 in which the sample is amplified using a polymerase chain reaction and primers for one or more of loci HUMVWFA31/A, HUMTH01, D8S1179, HUMFIBRA/FGA, D21S11 or D18S51 are employed.

17. One or more alleles comprising or consisting of sequences
TCTA TCTG TCTA (TCTG)₄ (TCTA)₃;
TCTA (TCTG)₄ (TCTA)₇;
(TCTA)₂ (TCTG)₄ (TCTA)₁ TCCA (TCTA)₃;
(TCAT)₄ CAT (TCAT)₇ TCGT TCAT;
(TCTA)₈;
(TCTA)₂ TCTG (TCTA)₁₆;
(TTTC)₃ TTTT TTCT (CTTT)₅ T (CTTT)₃ CTCC (TTCC)₂;
(TTTC)₃ TTTT TTCT (CTTT)₁₂ CCTT (CTTT)₅ CTCC (TTCC)₂;
(TTTC)₃ TTTT TTCT (CTTT)₁₆ CCTT (CTTT)₅ CTCC (TTCC)₂;
(TTTC)₄ TTTT TT (CTTT)₁₅ (CTTC)₃ (CTTT)₃ CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₁₆ (CTTC)₃ (CTTT)₃ CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₂₇ (CTTC)₃ (CTTT)₃ CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₆ (CTGT)₄ (CTTT)₁₃ (CTTC)₄ (CTTT)₃
CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₈ (CTGT)₅ (CTTT)₁₃ (CTTC)₄ (CTTT)₃
CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₁₁ (CTGT)₅ (CTTT)₁₄ (CTTC)₃ (CTTT)₃
CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₁₀ (CTGT)₅ (CTTT)₁₃ (CTTC)₄ (CTTT)₃
CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₁₂ (CTGT)₅ (CTTT)₁₄ (CTTC)₃ (CTTT)₃
CTCC (TTCC)₄;
(TTTC)₄ TTTT TT (CTTT)₁₄ (CTGT)₅ (CTTT)₁₄ (CTTC)₄ (CTTT)₃
CTCC (TTCC)₄;
(TCTA)₄ (TCTG)₆ (TCTA)₃ TA(TCTA)₁ TCA (TCTA)₂ TCCATA
(TCTA)₆ TCGTCT;
(TCTA)₅ (TCTG)₆ (TCTA)₃ TCA (TCTA)₂ TCCATA (TCTA)₉ TCGTCT;
(TCTA)₅ (TCTG)₆ (TCTA)₃ TCA (TCTA)₂ TCCATA (TCTA)₁₀ TCGTCT;
(TCTA)₄ (TCTG)₆ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₆ TCGTCT;

(TCTA)₅ (TCTG)₅ (TCTA)₂ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₉ TCGTCT;
 (TCTA)₄ (TCTG)₆ (TCTA)₃ TA (TCTA)₂ TCA (TCTA)₂ TCCATA
(TCTA)₁₀ TCGTCT;
 (TCTA)₄ (TCTG)₆ (TCTA)₃ TA (TCTA)₂ TCA (TCTA)₂ TCCATA
(TCTA)₁₁ TCGTCT;
 (TCTA)₆ (TCTG)₅ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₁ TCGTCT;
 (TCTA)₅ (TCTG)₆ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₂ TCGTCT;
 (TCTA)₅ (TCTG)₆ (TCTA)₂ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₁ TA TCTA TCGTCT;
 (TCTA)₅ (TCTG)₆ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₂ TA TCTA TCGTCT;
 (TCTA)₅ (TCTG)₆ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₃ TA TCTA TCGTCT;
 (TCTA)₅ (TCTG)₆ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₄ TATCTA TCGTCT;
 (TCTA)₁₀ (TCTG)₅ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₂ TCGTCT;
 (TCTA)₁₁ (TCTG)₅ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₂ TCGTCT;
 (TCTA)₁₁ (TCTG)₅ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₃ TCGTCT;
 (TCTA)₁₃ (TCTG)₅ (TCTA)₃ TA (TCTA)₃ TCA (TCTA)₂ TCCATA
(TCTA)₁₂ TCGTCT; or
 (AGAA)₈; or at least 75% homologous thereto.

18. One or more alleles according to claim 16 in which the alleles are provided purified from alleles other than those of HUMVWF/A31/A, HUMTH01, D8S1179, HUMFIBRA/FGA, D21511, D18551 or AMG loci.

19. The use of an allelic ladder according to claim 1 for comparison with a DNA analysis result.

20. The use of claim 19 wherein the analysis is a DNA profile of a sample and the profile is based on analysis of one or more of loci HUMVWFA31/A, HUMTH01, D9S1179, HUMFIBRA/FGA, D21S11, D18S51 OR AMG.

21. A method of producing an allelic ladder or mixture thereof by subjecting the ladders of any of claim 1 to PCR.

22. A method of producing an allelic ladder or mixture thereof by subjecting the alleles of any of claim 17 to PCR.

T002203200000